H76 Finding Clues on the Bony Surface: The Use of Markers of Occupational Stresses as Aids to Identification and Age Determination in Skeletonized Remains

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Attendees will gain an understanding of methods for assessing osteoarthritis and musculoskeletal stress markers, and the importance of these morphological features in forensic casework.

This presentation will impact the forensic community and/or humanity by highlighting the importance of assessing all features from skeletonized remains; and suggesting the use of standardized methods to assess osteoarthritis and musculoskeletal stress markers in forensic cases to aid identification and supplement age estimations

Forensic anthropologists often have a limited amount of physical material with which to investigate the possibility of a crime or to attempt to identify human skeletal remains. Therefore, it is important to incorporate as many lines of evidence that can be observed from the skeleton as possible. It has been noted that frequently forensic anthropology case reports include basic data on sex, age, race, stature estimates, and trauma from the skeleton, but they may not include additional morphological characteristics such as patterns of osteoarthritis (OA) or musculoskeletal stress markers (MSM). These bony changes are considered to result from biomechanical stresses applied to the bones during life and can be used to suggest possible lifestyles or activity patterns of the individual. Since bone progressively responds differently to such stresses with age, the degenerative nature of OA could provide additional clues as to the age at death of the individual.

In New Orleans in 2004, a case was investigated where the particular features of osteoarthritis of the shoulders, hands, and spinal column of the deceased could have provided important clues to identification had antemortem records been available. The suspected decedent was described as an elderly female who worked as a local seamstress in her home. The results of an osteological examination of the skeleton demonstrated that the deceased had extensive degenerative change in both shoulders, as well as severe bilateral changes in the 1st metacarpal-trapezium joint. The individual did not exhibit typical clinically reported patterns of joint degeneration of the hand, in that there was little deterioration of the distal phalangeal joints. This suggests some activity-related etiology was affecting that joint of the thumb specifically. The extent of the spinal osteoarthritis and scoliotic curvature of the lower spine would have produced a visible phenotype and greatly affected the individual's mobility. This pathological feature would be useful in aiding identification of the remains through interviews with known associates such as neighbors. The pathological changes observed in the skeleton present a unique pattern that would have had visible characteristics when the individual was alive.

Additionally, while there are no published sources for comparison with contemporary populations, the assessment of MSM and the contrast of the deceased's MSM scores with some prehistoric archaeological samples are of potential application. The MSM scoring patterns are not similar to prehistoric females, as expected since she lived in the Twentieth Century; however, the individual did demonstrate a high overall average score for MSM of the upper limb indicating a physically active life. In general, the osteological evidence is consistent with the suggested occupational activities of the individual as someone who used her arms and especially her hands a great deal, such as a seamstress would, but it does not definitively exclude other types of physical actions or possible occupations. The overall degree of joint deterioration and high MSM score is consistent with the suspected decedent's age at death.

While the analysis of OA is an important area of research in the modern medical field and is of interest to archaeologists studying health in ancient populations, forensic anthropologists do not frequently incorporate this data into their investigations. Observing and scoring of OA and MSM from skeletal cases in a systematic fashion can aid future investigations not only in describing clues for positive identification based on specific pathological conditions, but also in aging the skeletons. Additionally, such investigations could provide a significant counterpoint to clinical literature where the distribution and degree of bone modification is reported only from radiographs and patient commentary. Having modern data on individuals of known age, sex and life history can enlighten other areas of research on human biology and lifestyle.

Osteological Features, Osteoarthritis, Markers of Occupational Stress